to the bottom of the circle
erase it.
8 Make a line from the center
of boxes 14, 15, 24, and 25 to the center
of boxes 76, 77, 86, and 87.
9. Now make a line going from the
centers of the boxes 76, 77, 86, and 87
to the right-hand end of the
line that you made in the beginning
10. Make a line connecting the
the line that begins at the
center of 14 15, 24, 25 to the
left-hand end of the line
you made in the beginning

As a result of an instructional program in mathematics like that described in this guide, by the end of Grade 12, all students should be expected to complete work like the sample below:

SQUARES WITHIN SQUARES WITHIN SQUARES WITHIN...

A common design begins with a square. The four midpoints of the sides of the original square are connected to create a second square. This process of connecting midpoints continues, creating a design of squares within squares, alternately oriented like the original square and the original square rotated 45°.

1. Draw a square and the next five interior squares that emerge from successively joining midpoints.
2. Find the area of each of the squares you have drawn and explain the pattern you find.
3. What percent of the area of the original square is the area of the third interior square?
4. Suppose your original square was located at the points (0,0), (10,0), (10,10) and (0,10).
   - What are the coordinates of the fourth interior square?
   - Use your coordinates to find the area of this fourth interior square.
5. Starting with a square located at (0,0), (a,0), (a, b) and (0,b), where a=b, use coordinate geometry to prove that the second interior square has an area equal to one-fourth the original square.
6. Devise an alternative proof that the second interior square has an area equal to one-fourth the original square.

"Squares within Squares"

Area of the Squares (from largest to smallest):

(original) Sq. #1 : 72 $in.^2$

#2 : 36 $in.^2$

#3 : 18 $in.^2$

#4 : 9 $in.^2$

#5 : 4 in^2

#6 : 2.25 in^2

The pattern with the area of the squares appears to be that with the area of each square, the following one (in descending order) has its area divided in half. The area of square #2, which is approximately 36 sq. inches, when multiplied by two equals the approximate area of square #1. The area of square #3 is half of the area of square #2 and so on.

The ~~c~~ third interior square is approximately ~~12.~~ 5% the ~~the~~ original square.

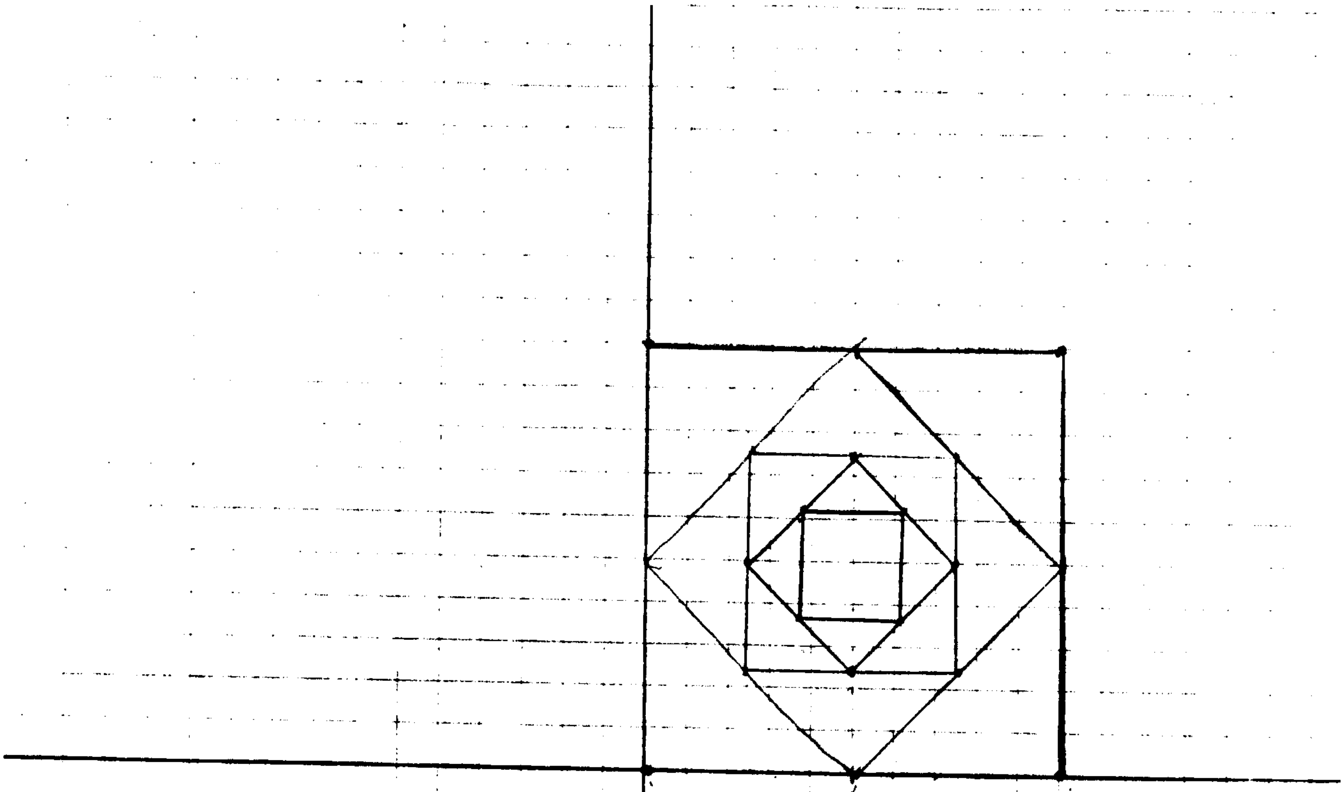
~~In~~ Part 4, by using the midpoint formula $\left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right)$, I was able to figure out the coordinates of each interior square. I found the area of the fourth interior square to be:

$(6\frac{1}{4}, 3\frac{3}{4}), (6\frac{1}{4}, 6\frac{1}{4}), (3\frac{3}{4}, 6\frac{1}{4}), (3\frac{3}{4}, 3\frac{3}{4})$.

And by finding the length of one of the

sides, by using the distance formula ($\sqrt{(x_1-x_2)^2+(y_1-y_2)^2}$), and squaring that answer, I found the area of the fourth interior square to be $6\frac{1}{4}$ sq. units.

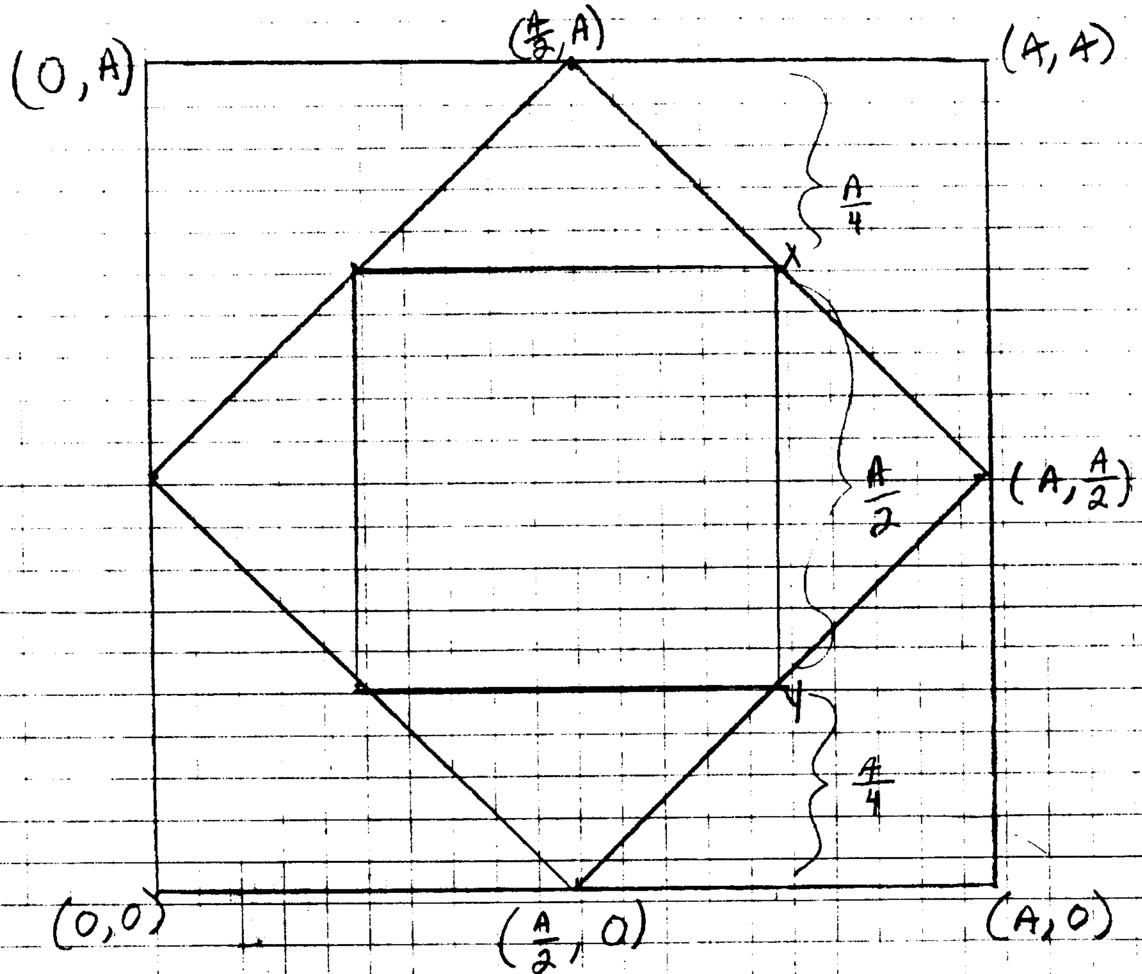
In part 5, A = B because it is a square. Knowing that the length of one side equals A, then the area of the original square = A^2. And by using logical reasoning, I figured out that each point on the 2nd interior square is set 1/4 the distance from the edge of the original square to the opposite edge. So if the distance from the edge of the 2nd interior square to the edge of the original square = $\frac{A}{4}$, then a side of the 2nd interior square = $\frac{2}{4}$ of A, or $\frac{A}{2}$. Knowing this, the area of the 2nd interior square = $\left(\frac{A}{2}\right)^2$, or $\frac{A^2}{4}$. Thus, the 2nd interior square = $\frac{1}{4}$ the area of the original square.



1st interior (5, 0), (10, 5), (5, 10) (0, 5)
2nd (2.5, 2.5), (7.5, 2.5), (7.5, 7.5), (2.5, 7.5)
3rd (5, 2.5), (7.5, 5), (5, 7.5), (2.5, 5)
4th (6.25, 3.75), (6.25, 6.25), (3.75, 6.25), (3.75, 3.75)

PART 4

A - B



PART 5

CONTENT STANDARD 7: Probability and Statistics

Students will use basic concepts of probability and statistics to collect, organize, display and analyze data, simulate events and test hypotheses.

K-12 PERFORMANCE STANDARDS

Educational experiences in **Grades K-4** will assure that students:

- pose questions, make predictions and solve problems that involve collecting, organizing and analyzing data;
- construct, read and interpret displays of data such as pictographs and bar and circle graphs;
- make inferences and formulate hypotheses based on data;
- generate and analyze data obtained from such chance devices as spinners and dice;
- develop intuition about the probability of various real-world events; and
- make predictions that are based on intuitive and experimental probabilities.

Educational experiences in **Grades 5-8** will assure that students:

- make conjectures; design simulations and samplings; generate, collect, organize and analyze data; and represent the data in tables, charts, graphs and creative data displays;
- make inferences and formulate and evaluate hypotheses and conclusions based on data from tables, charts and graphs;
- describe the shape of the data using range, outliers, and measures of central tendency, including mean, median and mode;
- select and construct appropriate graphical representations and measures of central tendency for sets of data;
- determine the probability of simple and compound events;
- model probabilistic situations using both simulations and theoretical methods;

(continued)

Educational experiences in **Grades 9-12** will assure that students:

- estimate probabilities, predict outcomes and test hypotheses using statistical techniques;
- design a sampling experiment, interpret the data, and recognize the role of sampling in statistical claims;
- use the law of large numbers to interpret data from a sample of a particular size;
- select appropriate measures of central tendency, dispersion and correlation;
- design and conduct a statistical experiment and interpret its results;
- draw conclusions from data and identify fallacious arguments or claims;
- use scatterplots and curve-fitting techniques to interpolate and predict from data;

(continued)

CONTENT STANDARD 7: Probability and Statistics

K-12 PERFORMANCE STANDARDS, continued

	Educational experiences in **Grades 5-8** will assure that students:	Educational experiences in **Grades 9-12** will assure that students:
	• make predictions that are based on experimental and theoretical probabilities; and	• use relative frequency and probability to represent and solve problems involving uncertainty; and
	• draw conclusions from data and identify fallacious arguments or claims.	• use simulations to estimate probabilities.

ILLUSTRATIVE TASKS AND EXPERIENCES

As part of ongoing mathematics instruction in Grades K-4, students should have instructional experiences like the following:

1. The "Mean" Kid

Create a survey form that will allow the class to collect data on the following:

gender	dominant hand
eye color	favorite kind of sneakers
hair color	favorite food
height	favorite sport
favorite color	(add others)

Assign groups of students to compile the class data for each item and create tables and graphs that display all of the survey information gathered. Students then are asked to use the tables and graphs to create and describe the "average" or "mean" class member. To do this, trace around on butcher paper the child that is the "mean" height, and "dress" this outlined person based on the appropriate data.

Extension: Compare this class "mean" kid with "mean" members of other classes at your grade level. Create a "mean" kid from your grade-level data, and compare to "mean" kids at other grade levels. This can become a schoolwide endeavor. In some schools, teachers have "built" the "mean" kid by stuffing clothes and making paper mache heads.

2. The Jumble

Using four different flavors of candy or four different colors of chips or cubes, ask each group of students to create an assortment of 10 candies (chips or cubes) and put the assortment in a bag. Tell students to switch bags with another group and to use "select, record, replace" techniques to try to predict the exact makeup of the assortment. Suggest that students in each group:

- take turns pulling a candy out of the bag;
- have a recorder keep track of what colors are picked; and
- put the candy back in the bag after each choice and mix the bag's contents well.

After 10 picks, ask students to make charts and predict the number of each flavor in the bag. Try another 10 picks and ask if their predictions change. Try a third set of 10 picks and ask students to individually write their predictions about the number of each flavor and why they made their predictions.

3. A Heat Wave Hits The Frog Pond

Tell your students that during a very hot day near the pond, the frogs started to play with a pair of dice. Have each student describe to a partner everything he or she knows about the dice. Tell students that the temperature keeps rising and the frogs are dripping with frog sweat! They want to get to the cool pond , so they decide to have a race.

Ask students to look at the Frog Race Game Board (see page 107), roll the dice and find the sum of the two numbers rolled. The frog whose number corresponds to the sum moves one space. Ask if there are any questions and let students, working in pairs, start playing the game.

After about eight rolls ask:

- Which frog is ahead?
- Are any frogs tied in the race?
- Are any frogs still waiting to start?
- Why haven't they moved?
- Which frog(s) won the race the most times?
- Is this a fair or unfair game? Why? Explain your thinking to your partner.

Ask students to keep a data chart to record race results over a period of time and to draw conclusions about any of the frogs. For example, what about Frog #6? Frog #7? What about Frog #2?

Ask students if they had an opportunity to bet on a frog, which frog would they bet to win? To lose? Why?

Extension: Can you create a fair game? Describe why your game is fair.

Frog Race Game Board

2												
3												
4												
5												
6												
7												
8												
9												
10												
11												
12												

Finish Line

4. Chocolate Chip Cookie Comparisons

Explain to students that they will rate three brands of chocolate chip cookies from most to least favorite. Distribute to each group of students three chocolate chip cookies that have been placed in clear plastic bags (to eliminate the influence of brand names and prices) and that are labeled samples A, B and C. Give students the following directions:

- Weigh each of three cookies per brand and estimate the number of chips per cookie.
- Assign each cookie a point value for taste, texture, appearance and overall quality and record data on group charts.
- Make a class graph rating each brand. Use this information to select the best overall brand after a discussion.

As part of ongoing mathematics instruction in Grades 5-8, students should have instructional experiences like the following:

1. Chocolate Chip Cookie Comparisons Part 2: Homemade Vs. Store-Bought

Extend the work with chocolate chip cookies (see Grades K-4) to comparisons between store-bought brands and homemade cookies. You will need a recipe for chocolate chip cookies, ingredients for the recipe, measuring cups, spoons and containers.

- Working in pairs, students use the materials provided to devise a way to find a reasonable approximation for the cost of one homemade cookie.
- Record strategies and comments in a math journal. Include at least two "what ifs" (e.g., What if we used nuts?).
- Based on the data you have collected, what would you advise families to do – bake or buy? Why?
- Use the information your class has generated to answer the following statement: An individual chocolate chip cookie in a nearby mall sells for 90 cents. Do you think this is a reasonable price or are they overpriced? Defend your answer using mathematical reasoning.

Extensions: Continue the discussion around questions and tasks like the following:

- What matters most: price, taste, number of chips per cookie?
- Which brand would you buy if you had a large family? Why?
- Is there a difference between a store brand and a name brand, or are you paying for the name?
- Do you think the quality of chocolate is the same in each brand?
- Write the kids' consumer magazine *Zillions* with your conclusion.

2. You're In A Pinch

Students are told that they are managing a softball team. It is the bottom of the ninth inning, two outs are gone and no one is on base. Your team is one run behind. You plan to send in a pinch hitter in hopes of scoring the tying run. Your possibilities are Joan, Mary and Bob. Their batting records are given in the table below. Ask students who they would chose to bat and to explain the reasoning behind their choices. Use the various selections and reasons in a class discussion on alternative ways of analyzing data.

	Joan	Mary	Bob
Home Runs	9	15	6
Triples	2	5	3
Doubles	16	11	8
Singles	24	34	18
Walks	11	20	12
Outs	38	85	36

3. Lucky Draw

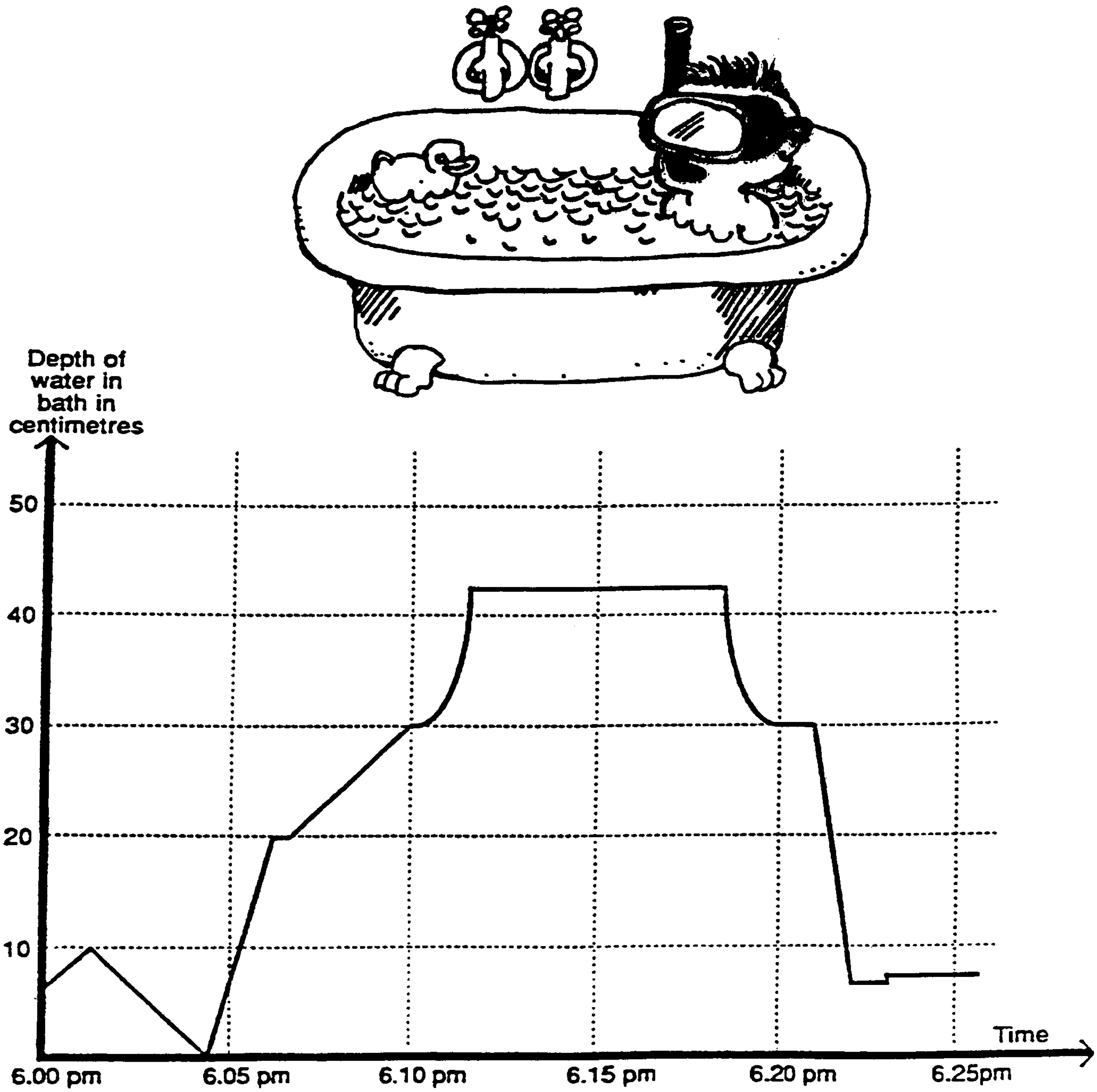
Students are presented with the following carnival booth game: Three small barrels each contain an equal number of red and blue marbles buried in sawdust. The sign over the booth gives the following information:

- 10¢ per turn;
- one turn allows you to make one lucky draw from each barrel; and
- win $1 if you draw three marbles of the same color on the same turn.

Your classmates are not sure whether this game is a good moneymaker. They turn to you to prepare a report to the carnival committee. Your job is to recommend keeping this game, or to show how to modify it to make it a moneymaker. You must support your recommendation with data and reasoning.

4. Billy's Bath

Distribute copies of the Billy's Bath graph to students. Be sure that students understand that they are looking at a graph of the depth of water in inches from 6:00 to 6:25 while Billy is taking his bath. Write a story that explains in as much detail as possible what is happening during Billy's bath and when it is happening.



From *Assessment Alternatives in Mathematics*, 1988.
Used with permission from Ray and Betty Smith Publications,
Doncaster, Victoria, Australia.

As part of ongoing mathematics instruction in Grades 9-12, students should have instructional experiences like the following:

1. Rolling Down The Alley

Present the following situation to students: A popular carnival game has five alleys, each worth some number of points. You get to roll two balls down the alleys and win a prize if the sum of the points from your two rolls is greater than some number. One version of the game has 5 one-foot-long alleys at the end of a six-foot-long playing board, with the 5 alleys worth 1, 5, 6, 8 and 11 points. You win if the sum of the two rolls is 16 or higher.

Ask students to work in groups to:

- determine the probability of winning this game, assuming that the balls roll into the numbered alleys randomly; and
- design a 5-alley game like this that offers three rolls for $1, that has a prize worth $2.50 and that will make money for the carnival owners. Show the points awarded in each alley, the number of points required for a win, and how you know the game will make money.

2. AIDS False Positives

Students are told that one of the most controversial public policy health issues is whether or not to conduct large-scale AIDS testing of the general population. We know that about 1/2 percent, or about 1 in 200 people, actually have AIDS. We also have an AIDS test that is 98 percent reliable, meaning that only 2 percent of all tests are wrong. Suppose we use this test on 10,000 randomly chosen citizens. Ask students to work on the following questions:

- How many of these 10,000 people would be expected to actually have AIDS?
- How many of these 10,000 people would be misdiagnosed, based on the test results?
- Calculate what percentage of those who test positive for AIDS actually have AIDS.
- Explain why many health professionals recommend against general AIDS testing of the population.
- What would happen if everyone who tested positive for AIDS was retested? What is the probability that someone without AIDS would get two positive test results?
- Explain the relationship between the rate of incidence of AIDS and the magnitude of false positives.

3. Most Valuable Player

Students are provided with the following task: There are many actions of a basketball player on the court that contribute to the successes and failures of his or her team. Working in a group with two or three classmates, design a system for determining the most valuable player for a given season (or game) based on attributes such as:

- number of field goals made;
- percentage of field goals made;
- number of three-point field goals made;
- number of assists; and
- number of turnovers that result in the opponent scoring.

Your task is to design and try out a system for using some of this data to determine who on the team should receive the Most Valuable Player Award. You might decide on numerical scores (positive or negative) for each of the actions you consider significant. However, for some of a player's actions it may be difficult to assign a numerical score. For example, a player's contribution to the spirit or morale of his or her team. You may weigh some actions as being more important than others. Explain your system in sufficient detail that another student could use it. Apply your scoring system to the members of a team, using actual statistics as published in a newspaper, for example. You have the option of choosing another sport or game for this activity.

4. Yankees vs. Mets

Culminate a unit on data analysis with a task like the following.

Application 42

Yankees Versus Mets

New York City has two baseball teams, the Yankees and the Mets. The following table gives the attendance and final standing for both teams each year since the Mets began play in 1962. There are no questions for this application. Your assignment is to make the plots you think are appropriate and interesting. Then write a report about your discoveries.

Here is a possible question to get you started: In a year when attendance for the Yankees is high does Mets attendance also tend to be high?

YANKEES			METS	
Finish	Attendance	Year	Attendance	Finish
Second	2,214,587	1985	2,751,437	Second
Third	1,821,815	1984	1,829,482	Second
Third	2,257,976	1983	1,103,808	Sixth
Fifth	2,041,219	1982	1,320,055	Sixth
First	1,614,533	1981	701,910	Fifth
First	2,627,417	1980	1,178,659	Fifth
Fourth	2,537,765	1979	788,905	Sixth
First	2,335,871	1978	1,007,328	Sixth
First	2,103,092	1977	1,066,825	Sixth
First	2,012,434	1976	1,468,754	Third
Third	1,288,048	1975	1,730,566	Third
Second	1,273,075	1974	1,722,209	Fifth
Fourth	1,262,077	1973	1,912,390	First
Fourth	966,328	1972	2,134,185	Third
Fourth	1,070,771	1971	2,266,680	Third
Second	1,136,879	1970	2,697,479	Third
Fifth	1,067,996	1969	2,175,373	First
Fifth	1,125,124	1968	1,781,657	Ninth
Ninth	1,141,714	1967	1,565,492	Tenth
Tenth	1,124,648	1966	1,932,693	Ninth
Sixth	1,213,552	1965	1,768,389	Tenth
First	1,305,636	1964	1,732,597	Tenth
First	1,308,920	1963	1,080,108	Tenth
First	1,493,574	1962	922,530	Tenth

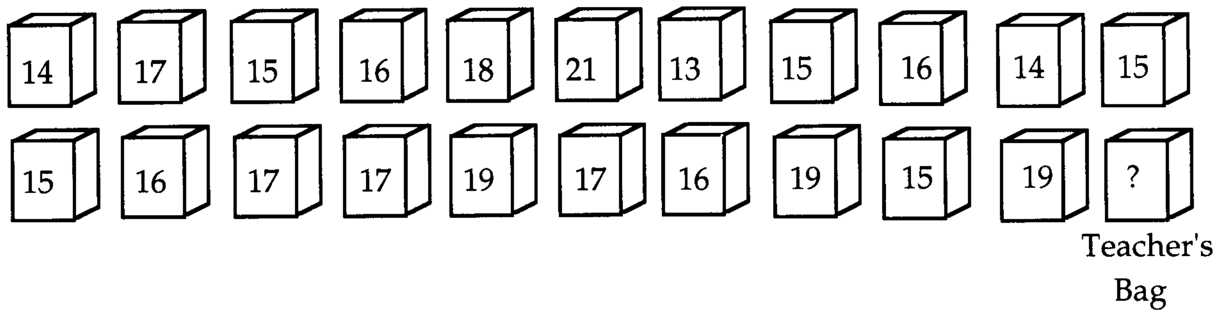
Source: *Newark Star-Ledger*, April 7, 1985.

PROTOTYPE ASSESSMENTS AND SAMPLES OF STUDENT WORK

As a result of an instructional program in mathematics like that described in this guide, by the end of Grade 4, all students should be expected to complete work like the sample below:

PEANUT PARTY

The fourth graders in Ms. MacDonald's class bought some peanuts that come in small bags. Each student in the class reported how many peanuts were in his or her bag. Here are the numbers the students reported:

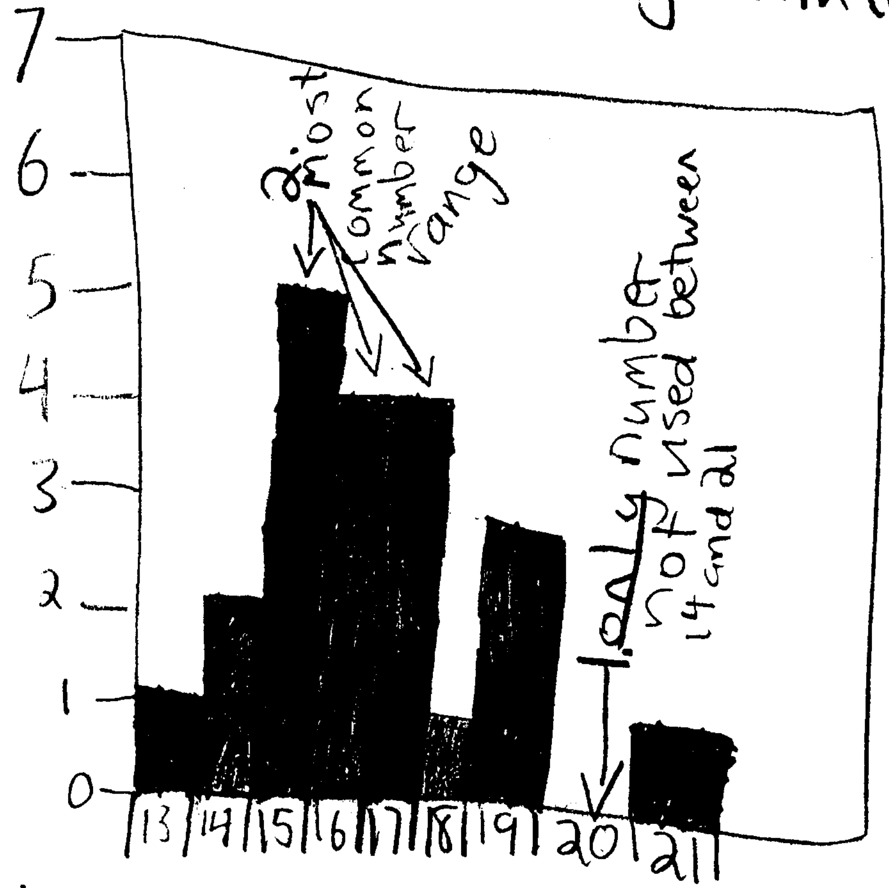


A. Organize these numbers in some way. You may make a graph, a table or an organized list.

B. Ms. MacDonald also bought a bag of peanuts from the same place. About how many peanuts do you think are in her bag? Explain your reasoning.

USE THIS PAPER FOR YOUR EXPLANATION OF: PEANUT PARTY

Number of Peanut Bags with Certain Amounts of Peanuts



1. I think that Ms. MacDonald got 20 peanuts in her bag. The reason I think so is out of 21 bags, none had 20 peanuts. So, I think that chances are, she'll get 20 peanuts.
2. It is also very possible for her to get between 15 and 17. My reasoning for this is, the majority of the peanut bags had this many peanuts in them

As a result of an instructional program in mathematics like that described in this guide, by the end of Grade 8, all students should be expected to complete work like the sample below:

TELEVISION VIEWING HABITS AND THEIR IMPACT

The following project assesses your ability to integrate and use your mathematical understandings to gather data, analyze the data and communicate your conclusions. You will have approximately two weeks to complete this project.

The following editorial appeared in your local newspaper:

TV Continues To Rot Young Minds

The evidence is clear. Study after study confirms what parents have suspected all along:

- American children watch too many hours of TV;
- American children watch too much violence on TV; and
- American children watch too many hours of cartoons.

One study suggests that, for every hour spent in school each week, the average 12 year old watches two hours of TV! Another study suggests that the typical child has seen 10,000 made-for-TV murders by age 14! And researchers have found that, by age 10, many children have already watched almost a year of cartoons!

It's time for parents to turn the TV off. It's time for children to rediscover reading and games and conversation and homework. It's time to stop the rotting of the minds of our young people.

Do you agree? Do editorials like this one make you angry? Do you believe what the studies show and the researchers mentioned in the editorial say? Well, how about doing something about it.

Your task for this project is to: **Write a detailed letter to the editor that summarizes how and why you agree or disagree with the claims made in the editorial. Your letter must be supported by data you collect from other students in your class or school. This data should then be organized into graphs or charts that should be included in your letter.**

To successfully complete this task you are expected to:

- design a survey that will allow you to test the claims made in the editorial;
- conduct the survey and gather data from at least 30 students;
- analyze the data and create some graphs or charts to display the data you have collected; and
- write a detailed letter to the editor that summarizes your findings, includes your graphs or charts, and states clearly whether or not you agree with the claims made in the editorial and why.

Your work will be evaluated on how well you have:

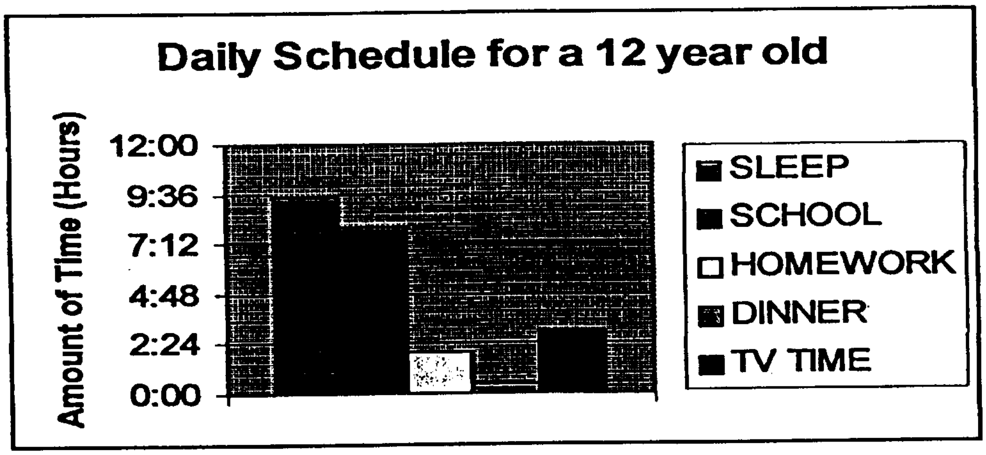
- identified the claims and gathered data to test those claims;
- organized your thoughts and used your data to argue for or against a claim or claims – that is, how good a case you make in support of or against each claim;
- used important mathematical ideas in designing your survey and analyzing your data; and
- communicated your findings effectively – both in words and graphically.

May 8, 1997

Dear Editor of the Glastonbury Citizen:

In your recent editorial about Television Viewing Habits and Their Impact: TV Continues to Rot Young Minds, I totally disagree with every statistic you gave to the people of Glastonbury. But I do agree with your comments that American children watch too many hours of TV, too much violence on TV; and children watch too many hours of cartoons. In the following paragraphs I have listed statistics that are reasonable than the ones originally listed.

In the article one study suggests that for every hour spent in school each week, the average 12-year-old watches 2 hour of TV. That says that this child witch spends about 8 hours in school is spending 16 hours watching TV when he or she gets home. I would like to know what kind of person this is! The calculator must have forgot that each child spends time studying, eating, and sleeping. I provide a graph to show the daily schedule of a 12-year-old.



The time in which the child could watch TV was based on the fact that he or she would get up at 7AM and get ready for school. Then they would start school at 8AM and would then be home by about 4PM.

Once they got home, he or she could do homework, eat, or watch TV in any order for about the next 5 hrs 30 minutes until they had to go to bed at 9:30 PM. Most children go to bed about that time and don't stay up later but for the one that do I have included a couple more minutes in the graph. Maybe your stats came from aliens.

Now, I agree with the fact that American children watch too much violence on TV. But, another study in the article suggests that the typical child has seen 10,000 made-for-TV murders by age 14. I disagree with this suggestion. One factor that first has to be considered is that from age 1-3 the child will not be interested in a show without songs and lots of color like a cartoon. Second, there are about 60 made-for-TV murders per month on TV. Here are the steps I followed in order to come to my conclusion.

60 TV murders (X) 12 months (X) 11 years of watching = Amount TV murders viewed

60 X 12 X 11 = 7,920 TV murders

In this area, if you were to also include all of the murder movies your number of murders could be well over 10,000 murders. But, if you don't like murder movies both the number of TV murders and movie murders would be lower. But the real violence comes from other shows like Mighty Morphing Power Rangers, or any other ninja or fighting shows. That should have been another study.

My final topic is I agree that American children watch too many hours of cartoons but disagree with the research that says that by the age of 10, children have already watched almost a year of cartoons. I say that they watch even more than that, it is about 1 year and 3 months! Here is how I came to my conclusion. I computed that at age 1, most babies aren't interested in cartoon. (I have a one-year-old brother.) But from age 2-7 one child watches about 4 hours of cartoons a day. So I then said it would take 6 days to make 24 hours of TV. Next, I divided 365 days by 6 and received 60.833. Last, I multiplied 60.833 by 24 then by 6, which stands for six years of watching cartoon.

365/6 = 60.833   60.833 x 24 = 121.666   121.666 x 6 = 8,759.9   about 8,760

Next, to figure out the amount of cartoons watched by children ages 8-10 first I divided 365 by 12 days in would take to complete 24 hrs. of TV. I figure at this age kids have more activities and are more interested in other programs. Then I multiplied that product by 24. At last, I multiplied that new product by 3 years of viewing.

365/12 = 30.416   30.416 x 24 = 729.999   729.999 x 3 = 2,189.999   about 2,190

2,190 + 8,760 = 10,950 hours of cartoons after 10 years of age
There are a only 8,760 hours in one year, so kids see a lot of bugs and daffy duck!

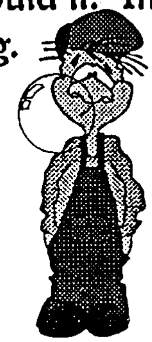
In conclusion, next time you print an editorial about recent statistics, please make sure they look correct so there won't be confusion and people angry with false information.

Sincerely,

MAY 5, 1997

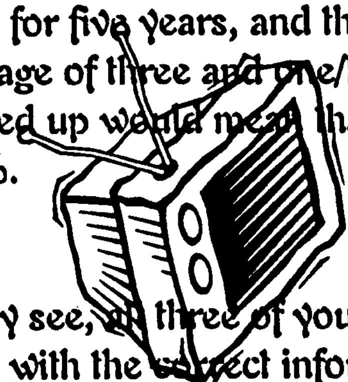
DEAR EDITOR,

In your paper, recently, you printed an article entitled, "T.V. continues to Rot Young Minds." It was an article that explained why t.v. was being viewed in excess amounts by children. It also included three surveys that had statistics on the average viewing habits of kids. Unfortunately, with me being a kid, I do not feel that this information is correct, nor could it. In the following report, I will explain to you why your article is wrong.



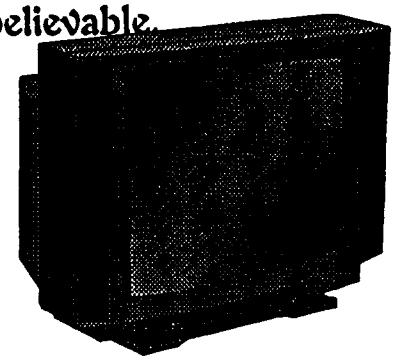
Your article is wrong because of the information associated with the surveys printed. In the first survey, you said that American children watch too much television and that for every hour spent in school each week, the average 12 year old watches 2 hours of t.v.. If this were true the average kid would watch about 12 hours per day. You wonder how that could be? Well I'll tell you. For begginers, the amount of time in school is doubled for the amount of television watched. The average school day is six hours long, so you would multiply that number times two, and you get twelve hours of television viewing per day. Now, personally, I don't think any 12 year old kid gets up, watches two hours of school from 5:00 AM to 7:00 AM, then gets ready from 7:00 AM to 8:00 AM, goes to school until 2:00 PM, gets home at 2:30 PM, and watches t.v. until 12:30 AM everyday without breaks. If that sounds odd, it is because there is no way that those numbers are real.

The second survey you included said that the typical child has seen 10,000 made-for-t.v. murders by the age 14. To find out how many murders per day, multiply 365 by 14 years, and you get 5110 days alive, and divide 10,000 by 5,110 and you get 1.956471, or 2 murders per day, since the kid was born. Now a reasonable explanation to that would be, either the kid watches nonstop horror or war movies, or he's watching the 12 hours a day hard for him to understand the show. Plus 31% of the kid's life from age 5-10 (the average age of kindergartners is 5) is spent in school. The average child sleeps 15 hours per day from a newborn to 4 years old, then from 4 to 5, the sleep is 12 hours, and from 5 to 10 is an average of 9 hours of sleep per day. So if at 10 years old, the child has been alive for 87,600 hours, and sleeps a total of 42,705 hours, he spends 49% of his life asleep. Plus the child spends one hours per day everyday eating, and one/half hour per day in the bathroom, and an average of two and one hour doing miscellaneous things, these extras are 15% of the child's life. That means if the child is at school, you add the six hours there, nine hours asleep, and five hours doing who knows what, these take up twenty hours of the day, leaving only FOUR hours per day to watch t.v. for five years. And let's say the parents decide to get the little tyke (age 0-5) some cartoon movies, and maybe let him watch some cartoons like Bugs Bunny, he'd still only watch about 3 hours per day. So, that's four hours per day for five years, and three hours per day for five years that's still only an average of three and one/half hours per day for 10 years. The percentages added up would mean that there is only room for t.v. to be 5% of the life, not 10%.



So, as you can obviously see, all three of your surveys are unreasonable and you should reprint them with the correct information. The children of America could not watch 12 hours of television per day while still going to school. The average child probably has seen about 3,000 made for t.v. murders by the age of 14, but the parents should not complain that the kids see too much television, but rather just not let the kid watch those programs. Because it's the parent's job to protect the child, and why blame t.v. if their kid gets curropted, they should have done something earlier. The third survey I have already explained, and clearly is unbelievable.

Professionally Yours,



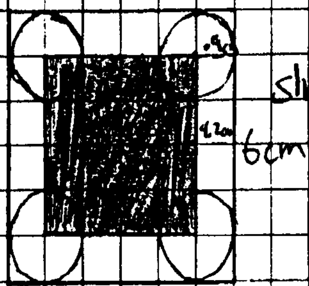
As a result of an instructional program in mathematics like that described in this guide, by the end of Grade 12, all students should be expected to complete work like the sample below:

THE FAIRGROUND COIN-TOSSING PROBLEM

A common carnival game is played by tossing a coin onto a large checkerboard pattern game board. If the coin lands entirely within any of the checkerboard squares, without touching any of the edges, you win a prize. If the coin touches or crosses the edge of any square, you lose the coin.

a) What is the probability of winning if the coin is a dime with a diameter of 1.8 cm and if the length of a side of the checkerboard squares is 6 cm?
b) If dimes are to be tossed, what should the length of a side of the checkerboard be so that the probability of winning is 40 percent?
c) Suppose the game involves tossing dimes onto 6-cm-sided squares where you lose the dime if you miss and win $1 if you land completely inside a square. How much money would you expect this version of the game to win or lose if 500 dimes are tossed onto the board?
d) Design a version of the coin toss onto the checkerboard game that you believe will be both popular and make money for the carnival by giving the diameter and the value of the coin, the length of the side of the checkerboard square, the value of the prize you get for winning, and the net expected earnings if 1,000 people play the game.

Fairground Coin Tossing Problem



shaded area = area center of dime can land in

(A) $6^2 = 36\,cm^2$
$4.2^2 = 17.64\,cm^2$
$\frac{17.64}{36} = .49 \times 100\% = \boxed{49\%}$ probability of winning

(B) $\frac{(x-1.8)^2}{x^2} = .4$ x= length of side

$(x-1.8)^2 = .4x^2$
$x^2 - 3.6x + 3.24 = .4x^2$
$.6x^2 - 3.6x + 3.24 = 0$

$\frac{3.6 \pm \sqrt{5.184}}{1.2} = x$

$x \approx 4.9$, ~~1X~~ smaller than diameter

$\frac{(4.9-1.8)^2}{4.9^2} = .4002 = 40\%$ $\boxed{\text{side length} = 4.9cm}$

(C) $500 \cdot 72\% = 360 \times \$1.00 = \$360$
$500 - 360 = 140 \cdot \$0.10 = \$14$
gained total net
$360 - 14 = \$346$ total money won with 500 dimes

(D) Side length 1.9cm
cost \$1.00 to play, but give them a dime
If they win give them \$100

$\frac{(1.9cm - 1.8cm)^2}{1.9cm^2} = .0027 = .27\%$ 3 out of every 1000 people will win.

$1000 \cdot \$1.00 = \$1000 - 1000 \cdot .1 = \$900$
$3 \cdot \$100 = 300$
$900 - 300 = \$600 + .1 \cdot 997 = \boxed{\$699.70 \text{ (total earnings)}}$

CONTENT STANDARD 8: Patterns

Students will discover, analyze, describe, extend and create patterns and use patterns to describe mathematical and other real-world phenomena.

K-12 PERFORMANCE STANDARDS

Educational experiences in **Grades K-4** will assure that students:	Educational experiences in **Grades 5-8** will assure that students:	Educational experiences in **Grades 9-12** will assure that students:
• reproduce, extend, describe and create patterns and sequences using a variety of materials and attributes;	• describe, analyze, create and extend a wide variety of patterns;	• identify, describe and generalize numerical and spatial patterns;
• use tables and graphs to display pattern data and explore a variety of ways to write rules that describe patterns and relationships; and	• represent and describe mathematical relationships using tables, rules, simple equations and graphs;	• identify, describe and generalize patterns from data and identify and analyze patterns of change; and
• develop and test generalizations based on observations of patterns and relationships.	• use patterns and relationships to identify the nth term in a sequence;	• predict and describe patterns produced by iterations, approximations, limits and fractals.
	• construct and analyze tables and graphs to identify patterns and relationships; and	
	• use patterns and relationships to represent and solve problems.	